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ADDENDUM NO. 6 TO REMEDIAL INVESTIGATION WORK PLAN

Geotechnical Stability Evaluation of the Clark Fork River Berm

Former Frenchtown Mill, Missoula County, Montana

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GEOTECHNICAL STABILITY EVALUATION OF THE CLARK FORK RIVER BERM

Former Frenchtown Mill
Missoula County, Montana

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DRAFT ADDENDUM NO. 6
TO THE REMEDIAL INVESTIGATION WORK PLAN

Geotechnical Stability Evaluation of the Clark Fork River Berm Work Plan
Former Frenchtown Mill, Missoula County, Montana

Version 2
Issued: September 26, 2017

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Project Coordinator
NewFields

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U.S. Environmental Protection Agency Region 8

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1.0 INTRODUCTION

Addendum No. 6 to the Smurfit-Stone/Frenchtown Mill Remedial Investigation Work Plan (RIWP; NewFields 2015a) describes a plan to complete a geotechnical stability evaluation of the Clark Fork River (CFR) berm at the former Frenchtown Mill (hereafter referenced as the "Site"). The Site location and Site map are included as **Figures 1** and **2**, respectively. This Addendum is prepared in accordance with Section 46 of the Administrative Settlement Agreement and Order on Consent (AOC) for Remedial Investigation/Feasibility Study (RI/FS) between the potentially responsible parties (PRPs; M2Green Redevelopment LLC, WestRock CP, LLC, International Paper Company) and the U.S. Environmental Protection Agency (EPA), filed November 12, 2015.

1.1 Project Background

The CFR berm is located just outside of Frenchtown, Montana at the former Frenchtown Mill. The berm is located on the western edge of the property, and generally parallels the CFR. The berm was constructed as a large man-made barrier between the CFR and the Site to facilitate containment and treatment of process effluent in a series of holding ponds.

A stability evaluation of the berm, and environmental sampling and analysis of the berm materials, was requested by the EPA in a letter dated April 25, 2017. The primary goals of this investigation are to evaluate whether the stability of the CFR berm provides minimum factors of safety against failure during high water (design flood) conditions. A secondary objective of the investigation is to determine whether the berm materials contain hazardous substances related to adjacent industrial processes that occurred at the Site.

1.2 Project Objectives

The primary objectives of this berm study are to:

- Review existing information, including berm design, construction, inspections, a channel migration study, and applicable regulatory guidance and criteria to guide the development of a field investigation;
- Characterize site-specific subsurface conditions and obtain data for engineering analyses;
- Perform geotechnical engineering analyses of berm stability for both typical and critical berm cross-sections to evaluate stability of the berm during design flood conditions (100-year flood event);
- Perform a field survey by visual observation of physical conditions along the length and surface of the berm to identify areas of potential concern related to berm stability; and,
- Document the findings and conclusions of the geotechnical berm stability evaluation in a written report. The findings of the study will be used to assess the adequacy of the investigation and evaluation in meeting the proposed objectives and to evaluate if additional study is warranted.

A secondary objective of the investigation is to collect additional soil samples of the berm materials to determine the nature and extent of contaminants at the Site.

2.0 EXISTING INFORMATION REVIEW

2.1 PROJECT BACKGROUND

To prepare the field investigation plan, a desktop study of existing information was initially completed to guide the investigation approach. Proposed locations of the boreholes and test pits to be completed as part of the investigation are based on a review of previous documentation related to the CFR berm and geology, including but not limited to:

- Historical aerial imagery and topographic maps (for evidence of potential paleochannels, stream locations prior to recent re-routing, etc.);
- Previous assessments of the embankment (CFR berm) and channel flow migration studies;
- State of Montana berm inspection records; and,
- 310 and Floodplain permit applications.

In addition, this desktop effort included a review of applicable permits required to investigate the berms by drilling boreholes or excavating test pits.

A discussion of our desktop review of key documents and materials follows.

2.2 SITE DESCRIPTION

The Site is located approximately 11 miles northwest of Missoula, Montana and about three miles southeast of Frenchtown, Montana within the northwestern portion of the Missoula Valley (**Figure 1**). The street address of the Site is 14377 Pulp Mill Road, Missoula, Montana. The geographical coordinates of the industrial center of the Site are latitude 46°57'51.71" North and longitude -114°12'00.02" West.

The valley elevation ranges from approximately 3,000 to 3,200 feet above sea level, with surrounding mountain ranges, including the Rattlesnake Range to the north, Sapphire Range to the east, the Bitterroot Range to the south, and the Ninemile Divide to the west, rising to elevations ranging from 5,000 to 8,000 feet. The CFR and Bitterroot Rivers drain the valley. The CFR flows westward through the valley and then north along the Site's western property boundary. The Site project area (including all three Operable Units; OUs) encompasses 3,150 acres. **Figure 2** depicts the site boundary and displays the CFR berm which is the focus of this work plan.

2.2.1 Hydrologic Conditions Review

The CFR berm is located within the CFR floodplain on the east bank of the CFR, and receives flood flows of varying magnitudes. The CFR is the largest river in Montana by volume; the upper CFR watershed had a drainage area upstream of the Site of approximately 9,000 square miles (FEMA, 1988). Flows in the CFR are dominated by snowmelt and precipitation, with seasonal high flows occurring during spring/early summer snowmelt periods. CFR flood flows are also influenced by infrequent rain-on-snow precipitation events and ice dams.

The current Flood Insurance Rate Map (FIRM) covering the Site was revised on July 6, 2015. The CFR water surface elevation during a 100-year recurrence interval flood event (design flood), or Base Flood

Elevations (BFEs), range from Elevation 3,054 feet to 3,037 feet across the Site. Berm stability is partially influenced by the height of the water surface against the berm, so an understanding of the BFE relative to the CFR crest elevation is critical to evaluate CFR berm stability during flood events.

2.2.2 Historic Clark Fork River Location and Pattern

A series of aerial photographs and historical maps of the Site were reviewed to understand how development of the Site and the CFR berm has influenced the location and pattern of the CFR and creeks (O'Keefe Creek and LaValle Creek) in the area. This historical information provides insight into conditions prior to, and during, development of the Site. A summarized review of historical information follows, and maps and aerial photographs are included in **Appendix A**. Each map and aerial photograph also shows an overlay of the property boundary, holding pond boundaries, and the FIRM floodplain.

2.2.2.1 Prior to Site Development

The 1912 USGS topographic map and aerial photos from 1937 and 1940 depict conditions prior to development of the site. In general, they appear to show relatively consistent conditions and do not indicate any major changes.

1912 USGS Topographic Map

A U.S. Geological Survey (USGS) topographic map from 1912 (USGS, 1912) is the earliest map at a scale which shows site details. This map, included as **Appendix A-1**, shows the CFR was in a very similar location and had a very similar planform, or pattern, compared to existing conditions. A river slough, or high flow channel, was evident in what is now holding pond (HP) HP2. Two major islands are depicted in approximately the same location as present day. The map shows the LaValle Creek and O'Keefe Creek confluence near the eastern edge of holding pond HP1a. O'Keefe Creek runs north and then west into the CFR slough in the area that is now holding pond HP2. A second CFR slough was located in what is now holding pond HP13, with smaller channels connecting the upstream end of this slough to the CFR.

1937 Aerial Photo

This photograph, included as **Appendix A-2**, was obtained from the National Archives (Farm Service Agency, 1937) and shows the CFR and tributaries before the Site was developed. O'Keefe Creek and LaValle Creek are shown in the southeast quarter of the figure. The aerial image shows the confluence of O'Keefe Creek and LaValle Creek was located just east of what is now holding pond HP1a. From the confluence, O'Keefe Creek ran north to intersect an old CFR meander where it then turned to the west and ran through what is now holding ponds P5, HP2, and joined the CFR in holding pond HP7. The main CFR channel was located against the west valley wall in a very similar configuration to existing conditions. A major depositional bar currently located just west of holding pond HP2 was not present in 1937.

1940 Aerial Photo

This photograph, included as **Appendix A-3** (Farm Service Agency, 1940), does not cover the northwestern corner of the Site but does include the upstream section of the CFR, LaValle and O'Keefe Creek. The locations of the CFR, O'Keefe Creek, and LaValle Creek are the same as shown in the 1937 photo. Some of the CFR depositional bars appear to be slightly different than the present day, but this is likely due to season variations in river stage.

1955 Aerial Photo

This photo (**Appendix A-4**; DNRC, 1955) depicts the period before industrial activities began at the Site in 1955. The CFR berm is not shown in the 1955 photo. Some notable changes in the 1955 aerial photo compared to the pre-development map and aerial photographs are as follows:

- A reach of O'Keefe Creek has been relocated and channelized just to the south of pond P17. As a result, this relocation moved the LaValle Creek confluence north to the northeast corner of holding pond HP1a. From this point O'Keefe Creek continues along its original channel to the main CFR channel.
- There are some slight differences shown compared to the CFR from the 1940 photo. The mid-channel bar located just south of HP2 is larger in the 1955 photograph and the northern channel has migrated to the east and north forming a meander with a short radius of curvature. Although this meander has aggraded with sediment and only receives high flows, it is still visible today. The CFR berm runs along this relic meander to the north.
- A new mid-channel bar is visible on the aerial to the west of holding pond HP2 that was not shown in the 1937 or 1940 photos. The new bar is in the same general vicinity of a much larger mid-channel bar present today. It is present in more recent aerial photos in virtually the same location and shape as the 1955 photo, with some seasonal variation.

Based on a comparison of historical information to present day conditions, the location and pattern of the CFR location is similar and appears largely unchanged over the past 100 years. The main channel is consistently positioned against the western valley wall, it has remained a single thread, and no significant changes to the planform are noted, with the exception of some changes in channel bar form.

2.2.3 Geologic and Geotechnical Conditions Review

NewFields reviewed available geologic and geotechnical data to develop an understanding of general subsurface conditions at the Site. This section presents brief descriptions of the regional and site-specific geology as well as a summary of conditions at the Site. The information presented was obtained from available literature and published reports as referenced herein.

2.2.3.1 Regional Geology and Hydrogeology

The Site sits in a relatively flat, low-lying area on predominately alluvial sediments associated with the CFR. The Site is underlain by saturated surficial alluvium comprised of poorly sorted, unconsolidated floodplain and channel silt, sands, and gravels. These materials are bound on the west side of the CFR by Precambrian bedrock and on the east side by fine-grained Glacial Lake Missoula sediments. "Shallow" groundwater is found in the upper 40 feet of the alluvial material. "Deeper" groundwater, where surrounding private water wells and the on-site water supply wells are installed to obtain adequate yields, is comprised of a larger cobbles and boulders beneath the shallow alluvial gravels to a depth of approximately 100 to 150 feet below ground surface (Grimestead, 1992; Smith, 1992; Woessner, 1988).

2.2.3.2 Berm Descriptions

Two types of berms exist on the Site: the CFR berm along the east bank of the CFR, and the internal berms located to the east of the CFR berm (**Figure 2**) which separate multiple holding ponds from one another.

Clark Fork River Berm

The CFR berm is the longest berm on-site with a total length of approximately 24,840 feet (4.7 miles). The cross-sectional dimensions and elevations vary along its length. In some locations, the top of berm elevation is only a few feet above a natural bench of native material that runs parallel to the CFR. In other locations the berm was constructed up to 25 feet above the surrounding natural ground elevation. Based on recent site observations, the berm generally ranges from 15 to 25 feet in height, has side slopes which range between 1.5 horizontal to 1 vertical (1.5H:1V) and 3H:1V, and has a crest width of approximately 15 to 25 feet. Along most of its length, a drainage swale runs along the west side of the embankment to capture seepage and transport it away from the berm. Portions of the CFR berm are armored with rip rap to prevent erosion during CFR high flows. Several of these armored portions have been permitted through the Missoula Conservation District (**Appendix B**).

In 2010, the DNRC inspected the CFR berm (which did not include any geotechnical evaluation) and stated "the earthen embankments surrounding the reservoirs [ponds] are constructed of homogeneous materials that have been excavated from the interior floor portions of the reservoirs [ponds]" (DNRC, 2010). Recent field observations suggest the berm was likely constructed using native material obtained on-site, from within the holding ponds.

Internal Berms

The internal berms on the Site were constructed as part of the mill's wastewater treatment system rather than to protect the Site from CFR floodwaters. The internal berms are numerous and of varied dimensions and elevations. Evaluation of internal berms is beyond the scope of this study, and is therefore not addressed in this work plan.

2.3 Previous Reports

The following documents were reviewed to develop a general understanding of the project area and are included in **Appendix B**.

- *Clark Fork River CMZ Pilot, Technical Memorandum,* (Applied Geomorphology and DTM Consulting, Inc. 2009);
- *Conditions and Hazard Assessment of Dams, Dikes and Levees Missoula Mill Facility, Engineering Report Draft,* (Civil & Environmental Consultants, Inc. 2009)*;*
- *Smurfit-Stone Storage Complex Hazard Classification, Memorandum,* (DNRC, 2010);
- *Levee Assessment Memorandum, Former Frenchtown Mill Site,* (NewFields, 2014);
- *Identification of Issues Related to Dike Stability along the Clark Fork River, (River Design Group, 2016;*
- *CFR River Stage Notes, Field Observations,* (NewFields, 2017a);
- *Missoula City-County Health Department Comments on Berm Investigation, (MCCHD, 2017; and,*

- SB-310 and Floodplain permits for the mill since 1974 (permit summaries are included in **Appendix B-8** and **B-9**, respectively).

2.4 Summary of Previous Site Evaluations

The following reports were completed by others to evaluate the condition of the CFR berms. The investigations were conducted by the DNRC, and Civil and Environmental Consultants, Inc. out of Export, Pennsylvania. Both of these investigations were visual site inspections, and did not include subsurface observations. A summary of relevant information from these key documents follows.

- ***Draft Conditions and Hazard Assessments of Dams, Dikes and Levees, Missoula Mill Facility, Missoula, Missoula County, Montana* (Civil and Environmental Consultants, Inc. 2009)**

  A visual site investigation was performed to complete a general risk evaluation rating form for each impoundment located at the Missoula Mill Facility. A meeting with the Smurfit Stone Container Company (SSCC) personnel and a questionnaire were also used to characterize hazards associated with the CFR Berms.

  The following general conclusions were offered by Civil and Environmental Consultants, Inc.

  - The majority of the holding ponds were classified as having a low risk rating. No further action was required, but periodic evaluation was recommended.
  - Holding ponds HP12, HP13, HP13a, and HP16 were classified as having a moderate risk rating with potential conditions of concern. A recommendation was made to monitor concerns associated with cattle-worn paths and continuous grazing which required re-grading and revegetation of the berm crest and slopes.
  - Holding pond HP18 was classified as having a high risk rating. A recommendation was made to evaluate and abate areas of concern observed along the western perimeter of this pond. The distressed area was about 30 feet in length, and the failure plane appeared to be about two feet in depth. The specific location along HP18 was not described in detail, and it is not known if this issue was addressed by the Mill operators.
  - Civil and Environmental Consultants, Inc. presented several recommendations to address issues identified during the berm assessment, including recommendation for concerns with vegetation, tree removal, animal burrows and cattle impacts, berm sloping, maintenance and inspection, and geotechnical evaluation. The findings of the report and the recommendations were considered during the development of the proposed scope for the geotechnical evaluation of the CFR berm.

- ***Smurfit-Stone Storage Complex Hazard Classification,* (Montana Department of Natural Resources and Conservation, 2010)**

  This letter dated March 10, 2010 described the findings of an investigation performed by the DNRC to determine a hazard classification for the CFR berms. The primary findings of this investigation are listed below.

  - Based on the DNRC dam and safety guidelines, the CFR berm located at the Missoula Mill Facility [Frenchtown Mill; Site] was classified as a Low Hazard Dam in accordance with the Montana DNRC Dam Safety Dam Inventory.

- The DNRC concluded that based on this classification, no regulatory requirements were applicable to the CFR berm.
- A new hazard classification would be needed if any major alteration was done to any of the structures that impound more than 50 acre-feet of water.
- The DNRC recommended yearly visual inspections. Further, the DNRC recommended structural inspections of the berms and appurtenances by a professional engineer every five years.

2.5 Recent Site Observations

The following information summarizes recent field observations made at the CFR berm by a NewFields hydrologist (NewFields, 2017a). These observations were made during visits to the Site in April, May, and June 2017.

- During site visits to monitor water levels in the CFR, it was noted that the river never rose above the toe of the berm at discrete monitoring locations along the CFR berm.
- Animal burrowing was noted on the south side of the CFR berm at holding ponds HP1a and HP2 and burrowing on west side of CFR berm at HP11.
- Erosion from cattle trails was noted on both sides of the berm at holding ponds HP1a and HP2 and scattered trails to holding pond HP13a.
- Bank erosion was observed at the southwest corner of holding pond HP2.
- Rip rap at the southwest corner of HP2 was observed to be in poor condition and scattered rip rap was noted on the west edge of HP13a.
- Vegetation, including a combination of occasional trees, shrubs, and grasses, was observed in areas along holding ponds HP2, HP7 and HP11.
- Culverts and pipes were observed to penetrate the berm at three different locations; two locations were noted at HP2 and HP7, and one location was noted at holding pond HP13a. These are the National Pollutant Discharge Elimination System (NPDES) permitted outfall structures for the wastewater treatment system.

2.6 Investigation Approach Based on Desktop Review Findings

The desktop review was completed using available information about the CFR Berms and inspections performed by other parties, reports, and recent site visits by NewFields personnel. Based on the findings of the desktop review, and available information, a combination of geotechnical boreholes and test pits are proposed to investigate the subsurface conditions at locations listed in **Table 1**.

The method for selecting investigation locations was based on:

- Evidence the CFR berm may have been constructed over potential paleochannels and/or former surface water channels;

- Recent observations of existing berm conditions such as animal burrows and areas of erosion caused by grazing cattle;
- Results of previous inspections which identified risk sections along the CFR berm alignment;
- A spacing between boreholes and/or test pits at a frequency of roughly 1,000 ft; and,
- Locating, at a minimum, one borehole or test pit at each holding pond.

Refer to **Table 1** which describes the rationale for selecting proposed borehole and test pit locations along the CFR berm. **Figures 3** and **4** show proposed borehole and test pit locations.

Table 1. Proposed Borehole and Test Pit Locations

STA (feet)	Observation	Objective	Reference Document / Information Source	Proposed Method of Investigation
6+20	Estimated former location of O'Keefe Creek stream channel	Evaluate berm stability	USGS Topographic Map (1912)	BH17-1 (P)
16+00	Location of animal burrows in the embankment	Evaluate berm stability	Recent site observations (NewFields, 2017a)	BH17-2 (P)
22+30	Location of animal burrows in the embankment	Evaluate berm stability	Recent site observations (NewFields, 2017a)	TP17-1 (P)
26+50	Location of potential paleochannel	Evaluate berm stability	Historic aerial imagery	BH17-3 (P)
32+30	Location of potential paleochannel	Evaluate berm stability	Historic aerial imagery	BH17-4 (P)
39+50	Location of potential paleochannel	Evaluate berm stability	Historic aerial imagery	BH17-5 (P)
45+75	Location of potential paleochannel	Evaluate berm stability	Historic aerial imagery	BH17-6 (P)
52+80	Estimated location high stress conditions during flood events	Evaluate berm stability; Area of care and maintenance performed after 1997 runoff event	Recent site observations (NewFields, 2017a)	BH17-7 (P)
57+10	Estimated location high stress conditions during flood events	Evaluate berm stability; Area of care and maintenance performed after 1997 runoff event	Recent site observations (NewFields, 2017a)	TP17-2 (P)
59+70	Estimated location high stress conditions during flood events	Evaluate berm stability; Area of care and maintenance performed after 1997 runoff event	Recent site observations (NewFields, 2017a)	TP17-3 (P)
64+85	Estimated location high stress conditions during flood events	Evaluate berm stability; Area of care and maintenance performed after 1997 runoff event	Recent site observations (NewFields, 2017a)	BH17-8 (P/A)
69+95	Location of OutFall #1 and potential paleochannel	Evaluate berm stability	Recent site observations (NewFields, 2017a) and historical aerial imagery	BH17-9 (P)

STA (feet)	Observation	Objective	Reference Document / Information Source	Proposed Method of Investigation
73+70	Location of potential paleochannel, between outfall culverts 1 & 2	Evaluate berm stability	Historic aerial imagery and recent site observations (NewFields, 2017a)	BH17-10 (P/A)
82+50	Typical berm conditions	Evaluate berm stability	None	BH17-11 (P)
97+00	Location of potential paleochannel	Evaluate berm stability	Historical aerial imagery	BH17-12 (P)
102+40	Location of animal burrows in the embankment	Evaluate berm stability	Recent site observations (NewFields, 2017a)	TP17-4 (P)
104+50	Typical Berm Conditions	Vicinity of HP10 and HP11	Site Map	BH17-13 (P)
114+75	Typical Berm Conditions	Vicinity of HP12	Site Map	BH17-14 (P)
119+55	“Conditions of concern may exist”	Potential erosion and stability concern	Civil & Environmental Consultants, Inc. (2009)	TP17-5 (P)
129+35	Location of paleochannel and in line with HP12	Evaluate berm stability	Historical aerial imagery	BH17-15 (P)
146+50	Location of paleochannel , outfall culvert 3 location, and in line with HP13a	Evaluate berm stability	Historical aerial imagery and recent site observations (NewFields, 2017a)	BH17-16 (P/A)
153+40	Typical Berm Conditions	Evaluate berm stability; Vicinity of HP13a	Site Map	BH17-17 (P)
171+70	“Conditions of concern may exist”	Potential erosion and stability concern	Civil & Environmental Consultants, Inc. (2009)	TP17-6 (P)
179+50	Typical Berm Conditions	Vicinity of HP13	Site Map	BH17-18 (P)
197+90	Typical Berm Conditions	Evaluate berm stability; Vicinity of HP18	Site Map	BH17-19 (P)

STA (feet)	**Observation**	**Objective**	**Reference Document / Information Source**	**Proposed Method of Investigation**
201+10	"Serious conditions exists"	Poor physical condition for levee and observation of slope failure	Civil & Environmental Consultants, Inc. (2009)	TP17-8 (P)

Notes:
BH – Borehole
TP – Test Pit
(P) – Proposed
(P/A) – Proposed / Analytical Sample
STA – Station (STA 100+30 = 10,030 feet along the berm from STA 0+00)

3.0 FIELD INVESTIGATION

The field investigation approach described below is designed as an investigation of conditions for subsequent geotechnical stability analysis and environmental assessment. The approach is based on berm stability evaluation objectives, past meetings with EPA, a conceptual investigation plan (NewFields, 2017b), and the findings of the desktop study. The geotechnical investigation approach described below is designed to characterize subsurface conditions within and beneath the CFR berm for subsequent geotechnical stability analysis and environmental assessment. The objectives of the field investigation are to:

- Perform a LiDAR survey to measure the berm crest elevation and geometry for overtopping and stability evaluations;
- Investigate lithology and subsurface conditions within and beneath the existing CFR berm using boreholes and test pits; and,
- Obtain geotechnical field and laboratory data to characterize material parameters (strength and hydraulic conductivity) for use in developing stability and seepage model cross sections.

In addition to the geotechnical objectives above, and at the request of the EPA, three environmental composite soil samples will be collected over the full thickness of the berm at three borehole locations (**Table 1**; **Figures 3** and **4**). The purpose of this sampling is to evaluate concentrations of dioxins and metals in berm materials.

Subsurface conditions will be investigated using a combination of boreholes and test pits as presented in **Table 2**, below.

Table 2. Geotechnical Investigation Approach

Investigation Method	Minimum Frequency (ft)	Anticipated Depth (ft bgs)	Proposed Number
Boreholes	One per holding pond	up to 40	19
Test Pits	As needed	up to 12	7

ft – feet
bgs – below ground surface

Drilling and test pitting will be directed, monitored, and logged by a qualified NewFields engineer or geologist.

3.1 LiDAR Survey

To assist with berm overtopping and stability evaluations, the elevation of the CFR along its length will be surveyed. NewFields proposes to complete an aerial LIDAR elevation survey of the berm and adjacent holding ponds in OU3 and compare these elevations to the FIRM Base Flood Elevations (BFE) map along the Site (at approximately 30 cross-sections). The proposed survey is expected to generate a bare-earth digital elevation model (DEM) with contours that meet National Standard for Spatial Data Accuracy (NSSDA) 1-ft standard.

3.2 Visual Field Survey of Existing Conditions

The surface conditions of the berm will be visually assessed to inventory areas of potential concern related to berm instability and erosion. The field survey will be documented by detailed notes, supplemented with annotated site maps and photographs. The field survey will be focused on observing riverbank slopes, rock outcrops (if any), cuts/fills, outfall and penetration locations, surface materials, poorly drained areas (if any), evidence foundation and slope, instability emerging seepage, erosion/scour (if any), animal burrowing, vegetation conditions, and natural and man-made physiographic features.

3.3 Permit Requirements

Based on our research of State requirements, we are unaware of any specific permits required by the State of Montana to implement the proposed geotechnical investigation. Prior to commencing the field investigation, NewFields will confirm with the Montana Department of Natural Resources and Conservation (DNRC). It is our understanding that there is no federal regulation of the CFR berm; therefore, no federal permits are required to drill boreholes or excavate test pits in the berm (USACE, 2014).

3.4 Drilling Investigation

A sonic drill rig will be used to drill boreholes from the crest of the embankment, through the embankment materials, and into the foundation soils to a minimum of 10 feet below existing berm material or to a maximum depth of 40 feet below ground surface. Based on actual subsurface conditions encountered, the final depth of the boreholes will be determined in the field, with EPA concurrence to adequately characterize the underlying lithology.

The sonic drill will collect a continuous soil core through the embankment and foundation soils. Soil types will be described and logged in accordance with the Unified Soil Classification System (USCS) Visual-Manual Procedure (ASTM D2487/D2488). Subsurface conditions will be presented as a continuous soil core log with supporting core photographs.

Driven penetration samples collected with either a Standard Penetration Test (SPT) per ASTM D1586 or modified-California (mod-Cal) sampler per ASTM D3550 will be used to correlate blow counts and subsurface conditions to in-situ conditions. Driven soil samples will be collected every two and a half feet in the upper 10 feet, then every five feet thereafter to depth. Sonic drilling will be used to extract either two and half foot, or five foot soil cores, followed by driving the soil sampler at the desired depths to obtain blow count information.

In general, SPT samples will be obtained for coarse grained, non-cohesive soils and mod-Cal samples will be obtained for fine-grained, cohesive soils. If soft, compressible fine-grained soils are encountered, a thin-walled Shelby Tube sampler will be used to obtain a relatively undisturbed soil sample per ASTM D1587.

Geotechnical soil samples will be selected for laboratory testing to characterize soil types based on actual soil conditions encountered. In addition, five-point composite samples of berm material will be collected from the soil core at three boreholes identified in **Table 1** and **Figures 3** and **4** in accordance with the RIWP Field Sampling Plan (NewFields, 2015b). All samples will be collected in accordance with Standard Operating Procedure (SOP) -14, labeled in accordance with SOP-3. The remaining soil samples will be archived until the final report is issued. Samples will be packaged and shipped in accordance with SOP-4. SOPs are included in **Appendix C**.

Drill cuttings will be spread on the ground surface around each borehole. Boreholes will be backfilled with cement bentonite grout placed via tremie method.

3.5 Test Pit Investigation

A track-mounted excavator will be used to excavate test pits along the berm slope and toe of embankment to investigate subsurface soil conditions. Bulk samples will be collected to characterize soil types. The soil encountered will be described and logged in accordance with the USCS. Upon completion, test pit spoils will be placed and compacted as backfill to the original grade. Subsurface conditions will be presented in a written test pit log with supporting photographs.

Test pits will be backfilled with test pit spoils, placed in 12- to 18-inch loose lift thicknesses, and compacted with an excavator vibra-plate attachment (or equivalent approved by the Engineer), making at least two passes over each lift of backfill with the addition of water for moisture conditioning, if necessary. Backfill operations will be continuously monitored by NewFields to ensure material is not loosely placed in test pit. Nuclear density gauge testing will be performed to document proper compaction of placed fill.

3.6 Laboratory Testing

3.6.1 Geotechnical Testing

Geotechnical testing of selected soil samples will be performed to characterize physical properties for use in engineering analyses. Geotechnical tests will consist of a suite of lab methods to determine natural moisture content, particle size distribution, Atterberg Limits (soil plasticity), dispersion, consolidation, permeability, and strength.

Soil samples will be collected every two and a half feet in the upper 10 feet, then every five feet thereafter to depth in boreholes. Soil samples will be collected at distinct changes in lithology observed in test pits. A representative subset of soil samples will then be selected to characterize subsurface conditions. Selected soil samples will be submitted to NewFields' materials testing laboratory in Elko, Nevada for geotechnical testing. The laboratory participates in American Association of State Highway and Transportation Officials (AASHTO) Accreditation Program, has AASHTO Materials Reference Laboratory (AMRL) accreditation, and is qualified to perform testing in accordance with the American Society for Testing and Materials (ASTM) standards.

Several geotechnical laboratory tests will be conducted on the collected samples, which may include the following tests:

Table 3. Preliminary Geotechnical Laboratory Test Schedule

Geotechnical Laboratory Test	Estimated Frequency of Tests per BH/TP	Estimated Total No. of Tests
Atterberg Limits (ASTM D4318 Method A/B)	1 per BH/TP	26
Consolidation, one-dimensional, with load/rebound (ASTM D2435)	1 per 6 BH/TP	4
Corrosion Testing, pH, resistivity, sulfates, chlorides (AASHTO T288-291)	1 per 14 BH/TP	2
Crumb Test (USBR 5410)	1 per 3 BH/TP	9
Direct Shear C/D, 3-pt (ASTM D3080)	1 per 3 BH/TP	9
Modified Proctor (Moisture-Density) AASHTO T180, ASTM D1557	1 per 6 BH/TP	4
Natural Moisture Content (ASTM D2216)	2 per BH/TP	52
Particle Size - Sieve Analysis with Hydrometer (ASTM D422)	1 per BH/TP	26
Permeability Test, flexible wall, Method D, 1 eff. stress (ASTM D5084)	1 per 3 BH/TP	9
Pinhole Dispersion (ASTM D4647)	1 per 6 BH/TP	4
Specific Gravity (ASTM D854)	2 per BH/TP	52
Triaxial C/U; 3 pts (ASTM D4767)	1 per 4 BH/TP	6

The geotechnical test schedule will ultimately depend upon actual subsurface conditions and soil types encountered during the investigation.

3.6.2 Environmental Testing

Three composite berm material samples will be submitted to Frontier Analytical Services for analysis of dioxins/furans (dioxins) and to Pace Analytical Labs for analysis of metals.

- Metals, including Al, As, Ba, Cd, Cr, Co, Cu, Fe, Pb, Mn, Ni, Ag, Tl, V, Z (EPA 6010/6020) and Hg (EPA 7470/7471); and,
- Dioxins/Furans (EPA 8290).

Sample handling requirements, analytical methods, and targeted detection limits are outlined in the RIWP Field Sampling Plan (NewFields 2015b) and Quality Assurance Project Plan (QAPP) (NewFields, 2015c).

3.7 Quality Assurance and Quality Control (QA/QC)

QA/QC procedures will be followed in accordance with the RIWP QAPP which is included as Appendix E of the RIWP (NewFields, 2015c) and Comprehensive Environmental Response, Compensation, and

Liability Act (CERCLA) QAPP guidance. In accordance with the RIWP QAPP, an equipment rinse blank (ERB) will be collected. The field quality control sample will be collected in accordance with SOP-21 (**Appendix C**). One additional sample container will be collected for the use as a site-specific Matrix Spike (MS).

3.8 Decontamination Procedures and Disposal of Investigation-Derived Wastes

Decontamination of sampling equipment will be performed to ensure the quality of samples collected. A list of field equipment to be used during this investigation is provided in each relevant SOP. To prevent cross-contamination between soil samples, all non-disposable sampling equipment will be decontaminated on-site between sampling locations using distilled water, Alconox detergent, and a methanol and/or nitric acid rinse in accordance with SOP-2 (**Appendix C**). Decontamination procedures will be conducted at locations identified by NewFields prior to sampling and at an appropriate distance from sampling activities. Disposable equipment intended for one-time use will not be decontaminated, but will be disposed as described in SOP-2.

Heavy equipment (excavator, drill rig, and support vehicles) will be decontaminated in accordance with SOP-2. All equipment will be decontaminated prior to arriving on-site and before exiting a holding pond, basin, or other excavation/drilling location. Water for decontamination will be supplied from an on-site potable water source. Equipment will be positioned so that rinsate generated during decontamination drains back into the holding pond or basin being exited by the equipment. If excavations or drilling occurs outside a holding pond or basin, rinsate will be discharged to the ground in a prescribed location identified by NewFields. A proposed sequence of test pits excavations, borehole locations, and area entrance/exit points to reduce the potential for cross contamination will be discussed with subcontractors one week prior to field work. Investigation derived waste will be handled according to SOP-22 (**Appendix C**).

3.9 Site Access and Locating Investigation Sites

Prior to the field investigation, NewFields will contact the Utilities Underground Location Center (UULC; 1-800-424-5555) to request all buried public utilities near proposed investigation locations be identified and marked. NewFields will work with the property owners to identify private utilities that may be present at the Site (including water, storm water, electric, natural gas lines, and/or underground irrigation lines). If NewFields determines the information provided by the property owners is insufficient to document the locations of underground utilities, a private utility locate contractor will be retained to confirm the locations of buried lines.

Locations of proposed sample sites will be marked with wooden stakes labeled with the name of the sampling location and date of completion. Sample locations and relevant site features will be recorded in the field using a resource-grade Global Positioning System (GPS). Access to proposed investigation locations is not a concern at this time; however, if a proposed investigation location is inaccessible, field adjustments will be made.

4.0 SAMPLE MANAGEMENT AND DOCUMENTATION

4.1 Field Documentation

NewFields personnel will document all activities in accordance with SOP-1 (**Appendix C**). Daily field records will be completed, as well as to-scale field drawings showing excavation and sampling locations. Field forms are provided in **Appendix D**.

4.2 Field Data Collection and Transmission

Prior to initiating fieldwork, all field staff will review the SOPs (**Appendix C**) to fully understand the investigative approach and data requirements. Appropriate pick up and shipping arrangements will be made in advance of sampling to ensure environmental samples are received by the labs within the required analytical method extraction timelines. Environmental samples will be placed in coolers with ice immediately upon sample collection to ensure sample integrity.

4.3 Sample Labels and Chain-of-Custody Forms/Seals

All samples will be labeled in general accordance with instructions described in SOP-3 (**Appendix C**) to ensure samples can be correctly and consistently identified.

4.3.1 Geotechnical Samples

Geotechnical samples shipped to the laboratory will be analyzed using standard turnaround times. Shipping documents will specify the laboratory analyses for each sample and clearly display a shipping label with all appropriate laboratory information in accordance with SOP-4 (**Appendix C**).

4.3.2 Environmental Samples

Analytical samples will be placed in ice-filled and sealed coolers for shipment to laboratory along with all appropriate shipping forms under chain-of-custody in accordance with SOP-3 (**Appendix C**). **Appendix D** contains sample chain of custody forms. Shipping documents will specify the laboratory analyses for each sample. All samples submitted for laboratory analysis will be analyzed using standard turnaround times. Each cooler will be secured with strapping tape and clearly display a shipping label with all appropriate laboratory information in accordance with SOP-4 (**Appendix C**).

5.0 HEALTH AND SAFETY PROCEDURES

A site-specific Health and Safety Plan (HASP; **NewFields, 2015a**) has been prepared for field activities planned as part of this investigation. The HASP lists contaminants of concern and the range of concentrations that may be encountered at the Site and associated human health hazards. All fieldwork will be conducted in accordance with the HASP. NewFields has designated Mr. Richard Leferink as the corporate Health and Safety Officer overseeing the project. A competent person will be appointed to enforce health and safety during the site investigation, as indicated in the HASP.

The HASP will be complemented by a Job Safety Analysis (JSA) worksheet to address safety concerns related specifically to drilling, excavation, and collection of soil samples (**Appendix E**). Field team leaders will conduct daily staff safety meetings guided by the HASP and JSA at the beginning of each workday. A copy of the HASP and JSAs will be kept on-site. JSAs will be modified during the investigation as needed.

The Gatehouse is the designated muster area. Sign in/out sheets and daily tailgate meetings are mandatory for all field personnel.

6.0 STABILITY AND SEEPAGE ANALYSES

The engineering analyses will consist of evaluating stability and seepage of the berm for steady-state static conditions during a design flood event.

6.1 Overtopping Evaluation

A LiDAR evaluation (**Section 3.1)** will be completed at the 30 BFE cross sections mapped in the FIRM (NFIP, 2013), to determine whether the geometry of the river has changed since 1985, and therefore changed the BFE on the Site. The evaluation will also determine whether the river at the BFE overtops the berm at the 30 mapped locations. Whether or not the CFR berm will be overtopped during a 100-year flood event between any two mapped BFEs will be qualitatively determined by comparing the highest BFE of the two locations to the surveyed LiDAR elevation of the berm between the two locations. If the highest BFE is above the berm elevation between two locations, it will be assumed to overtop somewhere along its length between the two locations.

6.2 Seepage and Stability Analysis

Stability and seepage analyses will be performed using the computer program Slide (7.0) by RocScience. Slide is a two-dimensional slope stability software program for evaluating circular and non-circular failure surfaces in soil or rock slopes using limit equilibrium methods. Slide also includes steady-state and transient finite element groundwater seepage analysis capabilities. Seepage and stability evaluations will be based on modeled conditions for steady-state static, seepage, and rapid drawdown conditions (receding flood waters) for the design flood event. Up to 18 cross-sections through the berm will be analyzed using Slide to model seepage and stability.

6.2.1 Model Development

Seepage and stability evaluations will be performed for sections of interest located along the CFR berm alignment and orthogonal to the berm crest. Cross section locations will be chosen to represent the most critical conditions, considering:

- The embankment height;
- The maximum water level during flooding conditions;
- Changes in berm geometry; and,
- Changes in the embankment fill and/or foundation soils.

6.2.2 Material Characterization

The hydraulic properties for the embankment and foundation materials will be developed using field and laboratory data and a correlation between particle size and hydraulic conductivity. Where no data are available, hydraulic properties will be assumed based on our experience with similar types of materials.

Soil strength parameters will be assigned to the subsurface materials to model berm stability. Strength values for soil types encountered during the investigation will be based on a review of field penetration test data and laboratory strength data, as available. A summary of the material properties used in the stability assessment will be presented in the geotechnical report.

6.2.3 Seepage Analysis

Seepage is defined as the slow, uniform flow of water through the embankment and embankment foundation. Control of seepage is important to ensure the stability of the downstream portion of the embankment by preventing excessive uplift pressures, possible piping phenomena, and excessive losses of water.

Seepage analyses will be performed to evaluate whether embankment and foundation soils are sufficient to control seepage through the embankment and prevent seepage from expressing along the downstream face of the embankment. The exit seepage gradient along the downstream face and toe of the embankment will be calculated and results compared to a factor of safety greater than 2.0 against particle movement to limit the potential initiation of piping (Cedergren, 1989).

6.2.4 Stability Analysis

Calculated factors of safety from the stability evaluation will be compared to the minimum factors of safety, as summarized in **Table 3**.

Table 4. Summary of Calculated Minimum Factors of Safety

Loading Conditions	Minimum Factor of Safety [1]
End of Construction Condition	1.3
Long Term Static Condition (steady-state seepage)	1.5
Rapid Drawdown Condition	1.1-1.3

1 – U.S. Army Corps of Engineers, Slope Stability Manual, EM 1110-2-1902 (2003)

6.3 Settlement Evaluation

The primary purpose of the settlement evaluation will be to evaluate whether conditions exist which may result in future, additional consolidation of embankment and foundation soils that could result in a lowering of levee crest elevation and/or loss of freeboard. Given the age of the CFR berm, it is unlikely that additional settlement beneath the embankment would occur; thus, the objective of this evaluation will be to evaluate whether any unique conditions are encountered during the field investigation that warrant concern.

7.0 EVALUATION OF ENVIRONMENTAL SAMPLE RESULTS

7.1 Data Management and Validation

Environmental data will be entered into the EPA Scribe database. Data usability review and Tier II data validation will be conducted on all data collected by NewFields during this investigation. As outlined in the RIWP QAPP (Appendix E of the RIWP; NewFields, 2015a), data usability and validation will be completed in accordance with guidance for conducting remedial investigations and feasibility studies under CERCLA and EPA Requirements for QAPPs.

7.2 Reporting

Upon receipt of analytical laboratory results, NewFields will prepare a separate technical memorandum, appended to the geotechnical report, describing the locations/depths of sampling, results of the investigation, and any deviations from the field or analytical methods described in this work plan.

Supporting documentation will be attached to the technical memorandum, including:

- A tabulated summary of soil sample analytical data;
- Figures depicting sample locations and concentrations of constituents of potential concern;
- A QA/QC summary, including Tier II data validation reports completed in accordance with EPA guidance; and,
- Appendices including field notes and field sampling forms; borehole, and test pit logs; laboratory analytical reports; and, photographs.

8.0 REPORTING

The findings of this study will be documented and presented in a report describing the field investigation, results of engineering analyses, and conclusions regarding whether the CFR berm meets specified factors of safety against failure during a design flood event (100-year flood event).

The report will be supported by various attachments, including: investigation location maps, borehole and test pit logs, site photographs, laboratory test results, results of the geotechnical evaluation, and Slide model inputs and results. The report will specify and summarize criteria used to evaluate berm stability; for example, water surface elevation (and corresponding flood event), embankment and foundation soil strengths, minimum factors of safety against modes of failure, freeboard requirements, etc.

A proposed project schedule accompanies this work plan submittal (**Appendix F**) and will be updated (if needed) as the project progresses.

9.0 REFERENCES

Applied Geomorphology and DTM Consulting Inc., 2009. Clark Fork River CMZ Pilot, Technical Memorandum. December 15, 2009

Cedergren, H.R., 1989. Seepage, Drainage, and Flow Nets, 3rd Ed., John Wiley and Sons, New York.

Civil and Environmental Consultants Inc., 2009. *Draft Conditions and Hazard Assessments of Dams, Dikes, and Levees Missoula Mill Facility, Missoula, Missoula County, Montana.* July 2009.

Farm Service Agency, 1937. Four aerial photographs dated June 29 and July 1, 1937. Scale of 1:20,000.

________, 1940. Three aerial photographs dated August 11, 1940. Scale of 1:20,000.

Federal Emergency Management Agency (FEMA), 1988. Flood Insurance Study, Missoula County, Montana and Incorporated Areas, Volume 1. August 16.

Grimestead, G., 1992. *Project Completion Report Hydrogeological Investigation*. Stone Container, Environmental Affairs.

Missoula City-County Health Department (MCCHD), 2017. Letter addressed to EPA, Region 8 Montana Office: review of investigation of the gravel berm at the former Smurfit mill site as part of the remedial investigation, dated February 17, 2017.

Montana Department of Natural Resources and Conservation (DNRC), 1955. Three Aerial photographs Dated 1955. Scale unknown.

________, 2004. *Small Earthen Dam Construction, A Guidebook for Planning and Construction of Small Earthen Embankments.* Water Resources Division, Dam Safety Program. September.

________, 2010. *Smurfit Stone Storage Complex Hazard Classification, Memorandum to Smurfit Stone.* February 8, 2010.

National Flood Insurance Program (NFIP), 2013. Digital Flood Insurance Rate Map (DFIRM) as defined by the Federal Emergency Management Agency.

NewFields, 2014. *Levee Assessment Memorandum, Former Frenchtown Mill Site.* August 13, 2014

________, 2015a. *Remedial Investigation Work Plan, Smurfit Stone / Frenchtown Mill, Missoula County, Montana.* Prepared for International Paper Company, M2Green Redevelopment, LLC, and WestRock CP, LLC. November.

________, 2015b. *Field Sampling Plan for the Smurfit Stone / Frenchtown Mill Site, Missoula County, Montana. Version 2, 11/09/2015*. Included as Appendix D of the Remedial Investigation Work Plan, November 2015.

________, 2015c. *Quality Assurance Project Plan for the Smurfit Stone / Frenchtown Mill Site, Missoula County, Montana. Version 2, 11/05/2015.* Included as Appendix E of the Remedial Investigation Work Plan, November 2015.

________, 2016. *Preliminary Data Summary Report, November / December 2015 Sampling Event, Smurfit Stone / Frenchtown Mill, Missoula County, Montana.* September.

________, 2017a. *Clark Fork River Stage Notes, Field Observations by Dan Hoffman.* April 19, 2017.

________, 2017b. Letter addressed to EPA, "Proposed Clark Fork River Berm Stability Evaluation, Former Frenchtown Mill, Missoula County, Montana." Dated 11 July.

River Design Group, 2016. *Identification of Issues Related to Dike Stability along the Clark Fork River.* March

Smith, C. A., 1992. *The Hydrogeology of the Central and Northwestern Missoula Valley* (Master's Thesis). University of Montana, Missoula, MT.

United States Geological Survey (USGS), 1912. Topographic Map of Missoula, Montana and the Bitterroot Mountains.

United States Environmental Protection Agency (EPA), 2017. Letter addressed to Mr. David Tooke: "Levee Analysis and Sampling Pursuant to the Administrative order on Consent for Remedial Investigation/Feasibility Study at the Smurfit Stone Mill site in Frenchtown, Montana", dated April 25.

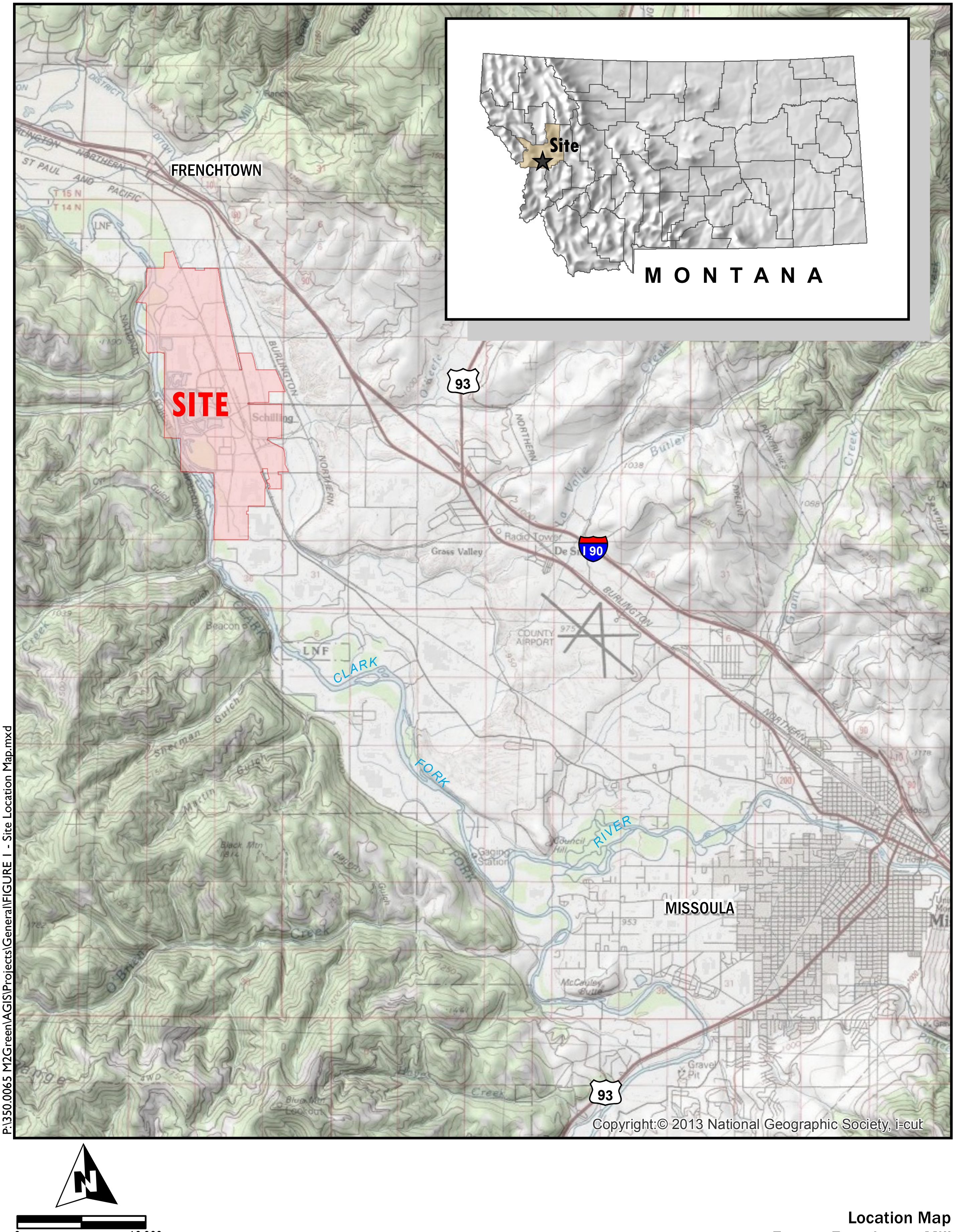
United States Army Corps of Engineers (USACE), 2000. Engineering and Design, *Design and Construction of Levees*, EM 1110-2-1913, 30 April.

________, 2003. Engineering and Design , *Slope Stability Manual*, EM 1110-2-1902, 31 October.

________, 2014. Engineering and Design, *Drilling in Earth Embankment Dams and Levees*; Regulation No. ER_1110-1-1807. December.

Woessner, W. , 1988. *Missoula Valley Aquifer Study: Hydrogeology of the Eastern Portion of the Missoula Aquifer, Missoula County, Montana.* (p. 127). Montana Department of Natural Resources and Conservation.

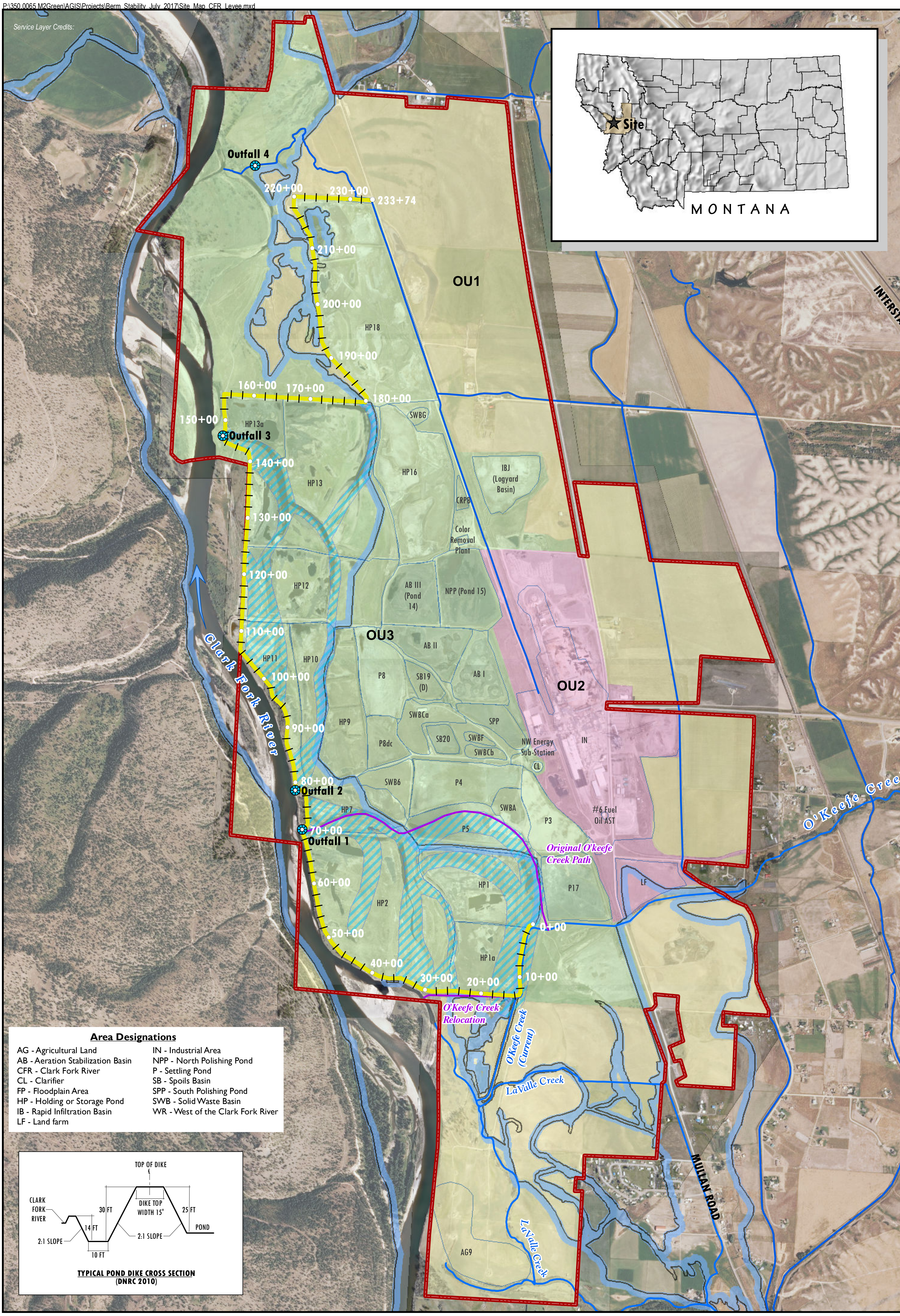
FIGURES



NewFields

Location Map
Former Frenchtown Mill
Missoula County, Montana
FIGURE 1

P:\350.0065 M2Green\AGIS\Projects\Berm_Stability_July_2017\Site_Map_CFR_Levee.mxd



N

0 Feet 2,000

NewFields

*Floodplain Source:
As defined by the Federal Emergency Management Agency (FEMA) 2013 Digital Flood Insurance Rate Map (DFIRM). (NFIP 2013)

**Derived From 1937, 1940, and 1955 Aerial Imagery

Aerial Photo Source: NAIP 2011 and NewFields 2016 (Within Site Boundary)

- Approximate Outfall Location
- Approximate Historic O'Keefe Creek**
- Approximate Historic CFR Features Crossing the CFR Berm**

STA 100+30 = 10,030 feet from berm STA 0+00

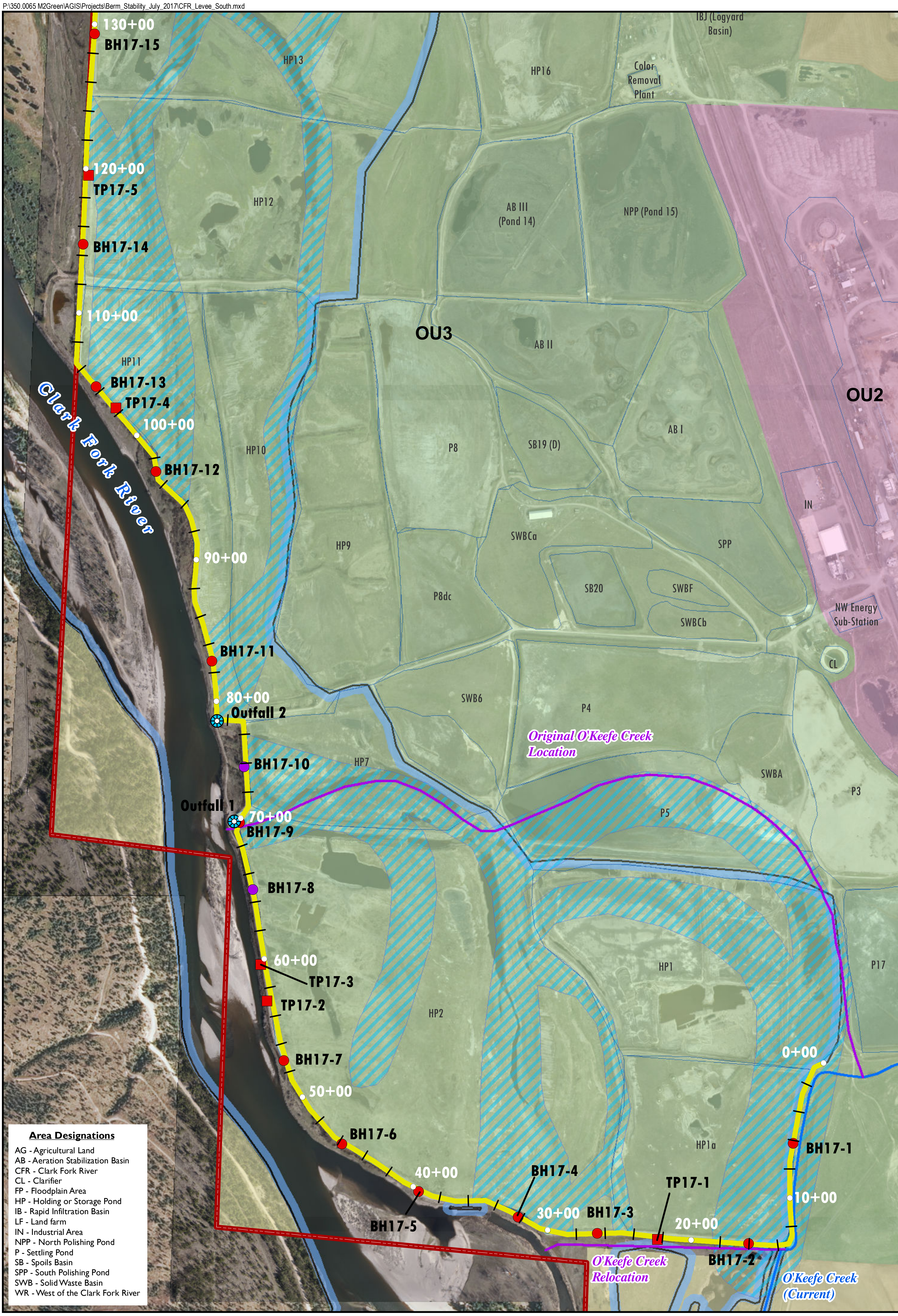
- 10+00 CFR Berm with 1,000-foot Stationing (200 foot intervals)
- 100-Year Floodplain*
- Mill Site Boundary

Operable Units (OU)

- OU1 - Agricultural Lands
- OU2 - Industrial Area
- OU3 - Wastewater Treatment and Storage Areas

Site Map
Former Frenchtown Mill
Missoula County, Montana
FIGURE 2

P:\350.0065 M2Green\AGIS\Projects\Berm_Stability_July_2017\CFR_Levee_South.mxd



0 800
Feet

NewFields

*Floodplain Source:
As defined by the Federal Emergency Management Agency (FEMA) 2013 Digital Flood Insurance Rate Map (DFIRM). (NFIP 2013)

**Derived From 1937, 1940, and 1955 Aerial Imagery

Aerial Photo Source: NAIP 2011 and NewFields 2016 (Within Site Boundary)

Approximate Historic O'Keefe Creek**

Approximate Historic CFR Features Crossing the CFR Berm**

Approximate Outfall Location

100-Year Floodplain*

Mill Site Boundary

STA 100+30 = 10,030 feet from berm STA 0+00

Proposed Test Pit

Proposed Borehole

Proposed Borehole with Analytical Sample

10+00 CFR Berm with 1,000-foot Stationing (200 foot intervals)

Operable Units (OU)

OU1 - Agricultural Lands

OU2 - Industrial Area

OU3 - Wastewater Treatment and Storage Areas

Berm Investigation Plan
(STA 0+00 to 130+00)
Former Frenchtown Mill
Missoula County, Montana
FIGURE 3

P:\350.0065 M2Green\AGIS\Projects\Berm_Stability_July_2017\CFR_Levee_North.mxd

N

0 Feet 800

NewFields

*Floodplain Source:
As defined by the Federal Emergency Management Agency (FEMA) 2013 Digital Flood Insurance Rate Map (DFIRM). (NFIP 2013)

**Derived From 1937, 1940, and 1955 Aerial Imagery

Aerial Photo Source: NAIP 2011 and NewFields 2016 (Within Site Boundary)

Approximate Historic CFR Features Crossing the CFR Berm**

Approximate Outfall Location

100-Year Floodplain*

Mill Site Boundary

STA 100+30 = 10,030 feet from berm STA 0+00

Proposed Test Pit

Proposed Borehole

Proposed Borehole with Analytical Sample

10+00 CFR Berm with 1,000-foot Stationing (200 foot intervals)

Operable Units (OU)

OU1 - Agricultural Lands

OU2 - Industrial Area

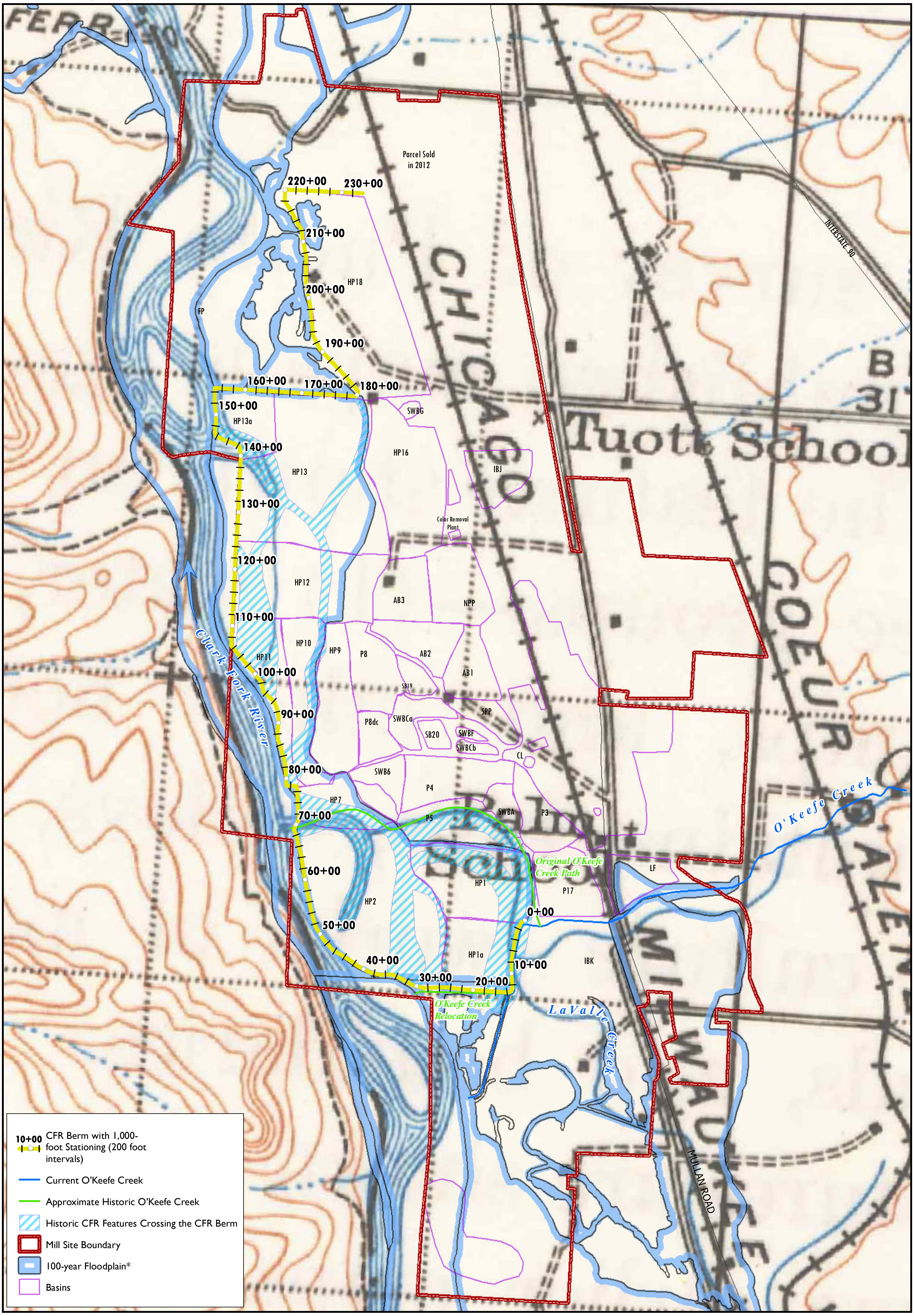
OU3 - Wastewater Treatment and Storage Areas

Berm Investigation Plan
(STA 130+00 to 233+74)
Former Frenchtown Mill
Missoula County, Montana
FIGURE 4

APPENDIX A

Historical Maps and Aerial Images

P:\350.0065 M2Green\AGIS\Projects\Ancillary_WWTS\Report\FIGURE B1 - 1912 Topo.mxd Revised 9/27/2017



*Floodplain Source:
As defined by the Federal Emergency Management Agency (FEMA) 2013 Digital Flood Insurance Rate Map (DFIRM). (NFIP 2013)

Georeferenced topographic map is accurate to +/- 30 feet

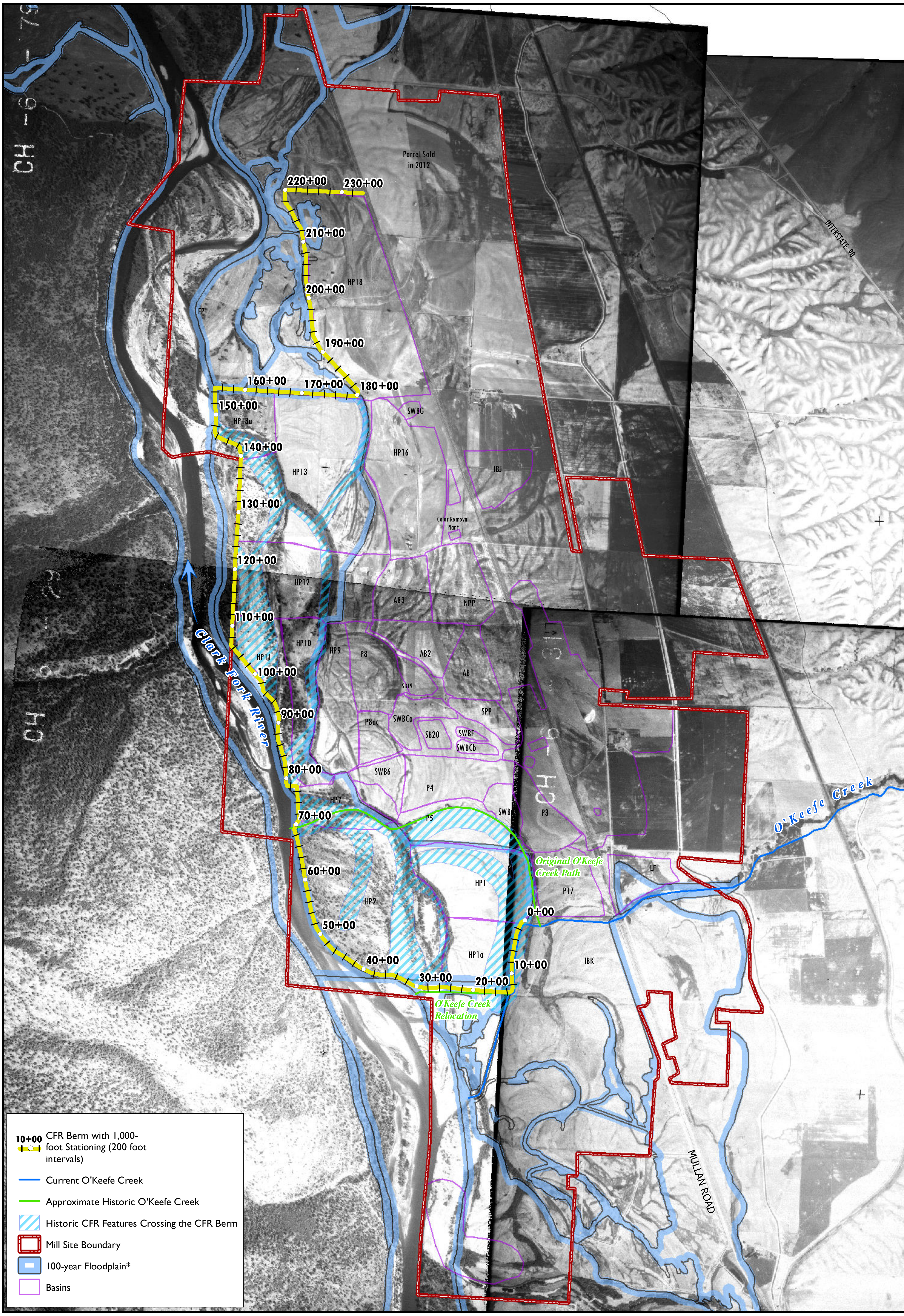
Notes

AG - Agricultural Land
AB - Aeration Stabilization Basin
CFR - Clark Fork River
COS - Certificate of Survey
HP - Holding or Storage Pond
IB - Rapid Infiltration Basin
LF - Land farm
IN - Industrial Area
NPP - North Polishing Pond
P - Settling Pond
SB - Spoils Basin
SPP - South Polishing Pond
SWB - Solid Waste Basin
WR - West of the Clark Fork River
FP - Floodplain Area

NewFields

1912 Topography Map
M2Green Redevelopment
Former Frenchtown Mill Site
Missoula County, Montana
FIGURE A1

P:\350.0065 M2Green\AGIS\Projects\Ancillary_WWTS\Report\FIGURE B2 - 1937 Aerial.mxd Revised 9/27/2017



N

0 Feet 1,600

NewFields

*Floodplain Source:
As defined by the Federal Emergency Management Agency (FEMA) 2013 Digital Flood Insurance Rate Map (DFIRM). (NFIP 2013)

Georeferenced aerial imagery is accurate to +/- 30 feet

Notes

AG - Agricultural Land
AB - Aeration Stabilization Basin
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IN - Industrial Area
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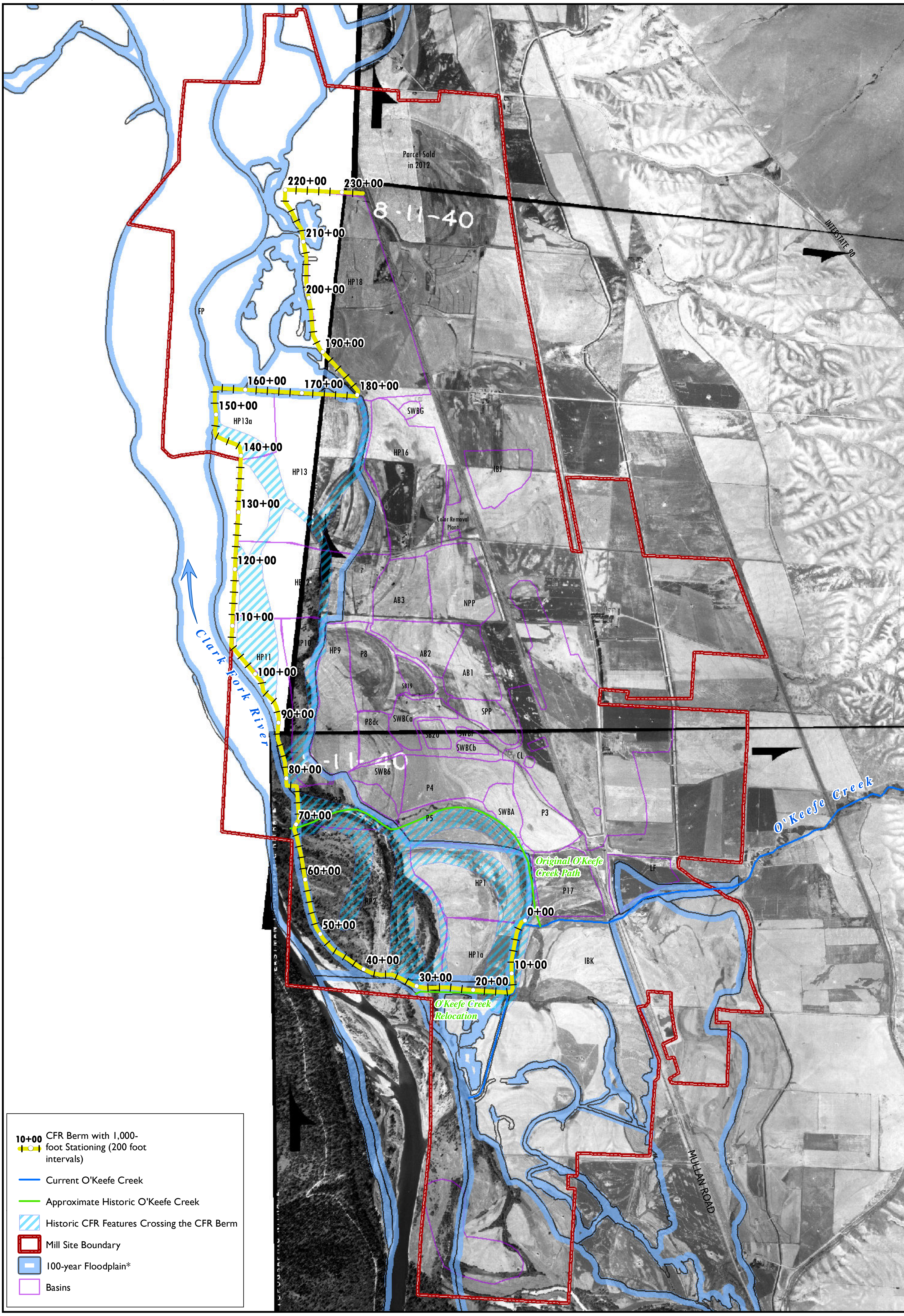
P - Settling Pond
SB - Spoils Basin
SPP - South Polishing Pond
SWB - Solid Waste Basin
WR - West of the Clark Fork River
FP - Floodplain Area

1937 Aerial Photo
M2Green Redevelopment
Former Frenchtown Mill Site
Missoula County, Montana
FIGURE A2

P:\350.0065 M2Green\AGIS\Projects\Ancillary_WWTS\Report\FIGURE B3 - 1940 Aerial.mxd Revised 9/27/2017



*Floodplain Source:
As defined by the Federal Emergency Management Agency (FEMA) 2013 Digital Flood Insurance Rate Map (DFIRM). (NFIP 2013)

Georeferenced aerial imagery is accurate to +/- 30 feet

Notes

AG - Agricultural Land
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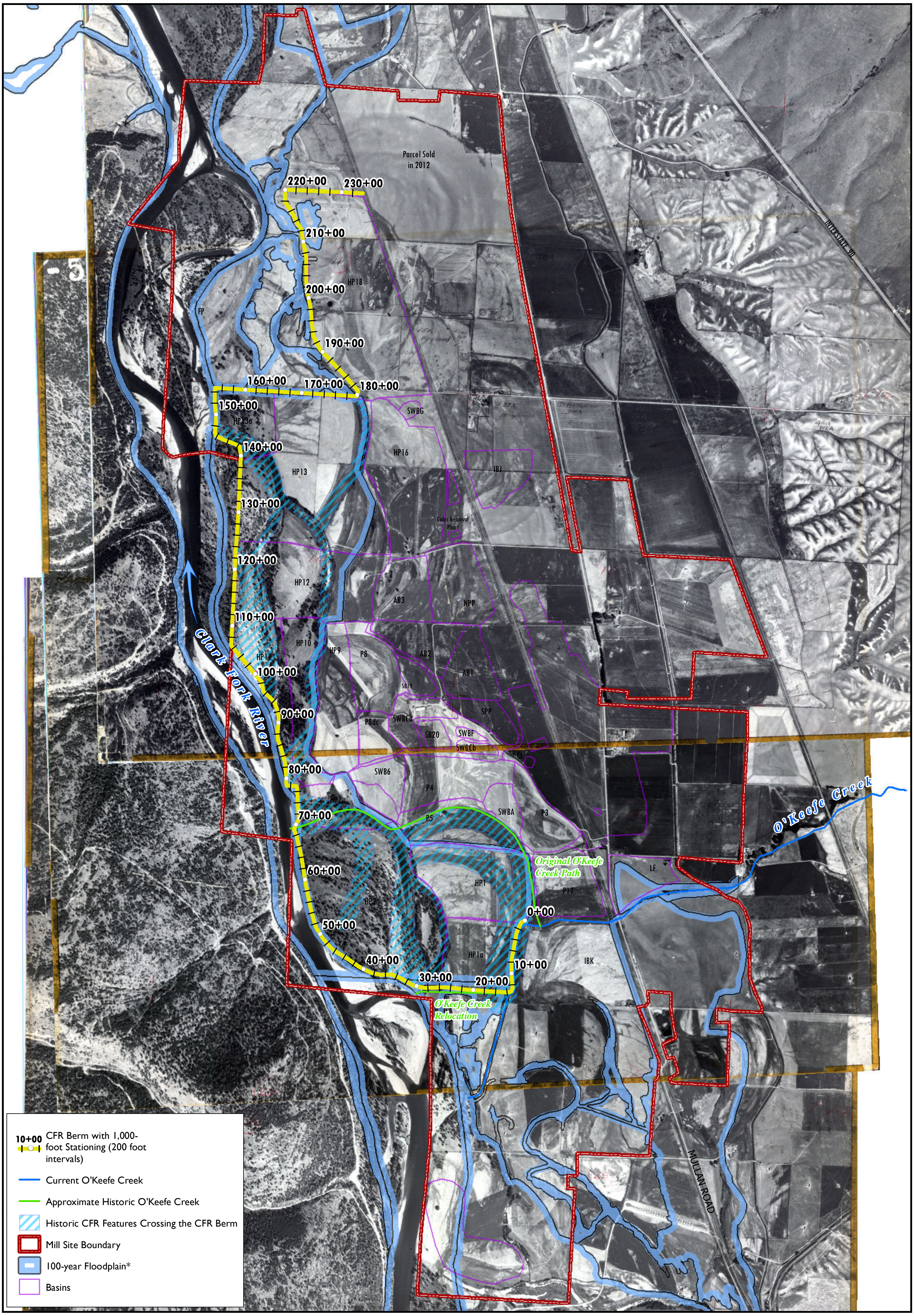
P - Settling Pond
SB - Spoils Basin
SPP - South Polishing Pond
SWB - Solid Waste Basin
WR - West of the Clark Fork River
FP - Floodplain Area

NewFields

1940 Aerial Photo
M2Green Redevelopment
Former Frenchtown Mill Site
Missoula County, Montana
FIGURE A3

P:\350.0065 M2Green\AGIS\Projects\Ancillary_WWTS\Report\FIGURE B4 - 1955 Aerial.mxd Revised 9/27/2017



*Floodplain Source:
As defined by the Federal Emergency Management Agency (FEMA) 2013 Digital Flood Insurance Rate Map (DFIRM). (NFIP 2013)

Georeferenced aerial imagery is accurate to +/- 30 feet

Notes

AG - Agricultural Land
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HP - Holding or Storage Pond
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SB - Spoils Basin
SPP - South Polishing Pond
SWB - Solid Waste Basin
WR - West of the Clark Fork River
FP - Floodplain Area

NewFields

1955 Aerial Photo
M2Green Redevelopment
Former Frenchtown Mill Site
Missoula County, Montana
FIGURE A4